



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Docket File

AUG 27 1984

Docket Nos.: 50-445
and 50-446

Mr. M. D. Spence
President
Texas Utilities Generating Company
400 N. Olive Street
Lock Box 81
Dallas, Texas 75201

Dear Mr. Spence:

Subject: Results of NRC Staff Pre-Licensing Audit of the Control Room
Design for Comanche Peak Steam Electric Station (Units 1 and 2)

The enclosed audit report presents the results of the staff's onsite audit of the Comanche Peak control room design conducted the week of July 30 - August 3, 1984. The report identifies several items which must be satisfied prior to Unit 1 licensing. These items include completion of corrective actions for some of the human engineering discrepancies (HED's) identified during the audit review (about 90% of which have already been corrected). Should your staff find that some of those HED's will not be corrected prior to Unit 1 licensing, it is requested that you submit a report identifying the HED's, providing the basis for not correcting them prior to licensing. Correction of those HED's, not required for licensing, that remain open, will be cited as license conditions in the Unit 1 license issued.

Satisfaction of the Detailed Control Room Design Review (DCRDR) requirement in Supplement No. 1 to NUREG-0737 (NRC Generic Letter 82-33) requires completion of additional items. They are noted in the enclosed audit report. The licensing of Unit 1 is not dependent upon completion of the DCRDR, although the DCRDR may be completed prior to Unit 1 licensing. The schedules for completion of the Comanche Peak, Units 1 and 2, DCRDR's should be communicated to the Project Manager.


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Please advise the Project Manager when we may expect to formally receive your schedule for resolution of HED's prior to licensing and those to be completed after licensing, not later than 5 days after receipt of this letter. All HED's deferred for resolution after licensing must be corrected before plant operation will be permitted to exceed 5% of thermal rated power.

Sincerely,


B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing

Enclosure:
As stated

cc: See next page

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8/27/84

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Docket File

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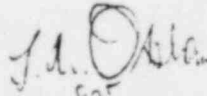
*S. Burwell

AUG 27 1984

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Sincerely,



B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing

Enclosure:
As stated

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AUDIT REPORT
ON THE
CONTROL ROOM DESIGN REVIEW
FOR
COMANCHE PEAK STEAM ELECTRIC STATION

DISCUSSION

Texas Utilities Generating Company (TUGCO) is performing a control room design review for Comanche Peak Steam Electric Station (CPSES). Information on the Nuclear Regulatory Commission (NRC) staff evaluation of that review, through November 1983, was provided in Supplement 4 to the Safety Evaluation Report (SER). Subsequent to issuance of SER Supplement 4, TUGCO submitted Supplements 1 and 2 to the "Human Factors Control Room Design Review of Comanche Peak Steam Electric Station." The first Supplement, dated March 8, 1984, provided:

1. Clarification of responses to human engineering discrepancies (HEDs) as requested in the June 21, 1983, NRC Control Room Audit Report
2. Responses to HEDs identified during the April 1983, control room audit
3. HEDs identified as the result of interim environmental surveys in the Unit 1 control room
4. A cross-reference to Detailed Control Room Design Review (DCRDR) Program Plan information
5. Information on the function and task analysis

The second Supplement, dated June 29, 1984, provided:

1. Status of HED corrections
2. Revised responses to several HEDs
3. Results of an environmental survey at the remote shutdown panel

Information in TUGCO's December 1982 report and the two supplements was reviewed by the NRC staff. Based on the results of that review, an audit of the CPSES control room design review was conducted from July 30 - August 3, 1984. The purpose of the audit was to determine the status of HED corrections in the Unit 1 control room and remote shutdown panel and to gain information on satisfaction of the DCRDR requirements (defined by Supplement 1 to NUREG-0737). Results of the July 30 - August 3, 1984 audit are provided below.

AUDIT OF HED CORRECTIONS

The implementation status of corrective actions for all open HEDs was audited. Corrections for most of those HEDs were found to be acceptably implemented. Approximately 90 percent of all HEDs identified in the CPSES Unit 1 control room and at the remote shutdown panel have now been corrected and are closed. Each open HED requires one of the following actions:

1. Implementation of correction and NRC audit prior to licensing
2. Clarification of response prior to licensing
3. Post-licensing submission of environmental surveys
4. Post-licensing assessment and selection of design improvement as part of the ongoing DCRDR

Details are provided in the attached list.

The NRC's Senior Resident Inspector has been provided with a list of those HEDs which should be corrected before licensing. TUGCO personnel conducting the DCPDR have been asked to:

1. Coordinate an audit of those HEDs with the Senior Resident Inspector to support the NRC staff's submission of input to the Safety Evaluation Report by September 1, 1984
2. Submit clarifications and a status report on any uncorrected HEDs by August 27, 1984

Correction of HEDs remaining open after the NRC staff's submission of SER input will be recommended as a license condition to be completed prior to CPSES Unit 1 exceeding 5 percent power (with the exception of HEDs for which final resolution has been deferred until completion of the DCRDR).

TUGCO personnel conducting the DCRDR have also been asked to:

1. Conduct and submit the results of environmental surveys documenting the effects of correcting several HEDs and identifying any new HEDs
2. Continue assessment and selection of design improvements for several HEDs as part of the ongoing DCRDR

Resolution of HEDs identified by the environmental surveys and of HEDs deferred to the DCRDR should be reported in a supplement to TUGCO's "Human Factors Control Room Design Review of Comanche Peak Steam Electric Station," to be submitted prior to CPSES Unit 1 exceeding 5 percent power. HEDs identified by the environmental surveys should be factored into the ongoing DCRDR.

AUDIT OF DCRDR PROCESS

TUGCO's "Human Factors Control Room Design Review of Comanche Peak Steam Electric Station," Report and Supplement 1 to that report provided information about the CPSES DCRDR. That information was reviewed against the DCRDR requirements of Supplement 1 to NUREG-0737, and TUGCO was provided with written comments by the NRC staff. Staff review of the Program Plan indicated several topics for which adequate information was not provided. They were:

1. Level of participation of personnel from various disciplines in the different DCRDR tasks
2. Completion of the function and task analysis and comparison of results with a control room inventory to verify availability and human factors suitability of instruments and controls required for emergency operation
3. Verification that HEDs provide necessary correction and do not introduce new HEDs
4. Coordination of control room improvements with changes from other programs

The above topics were discussed briefly during the July 30 - August 3, 1984 audit. The NRC staff's current understanding of the topics is summarized below.

Participation of personnel from various disciplines. Resumes for personnel from a number of disciplines were provided in the "Human Factors Control Room Design Review of Comanche Peak Steam Electric Station," report. However, the level of participation by personnel from the various disciplines in the different DCRDR tasks was not provided. Discussions with TUGCO indicated that the full multidisciplinary team (including human factors personnel from Essex Corporation) was involved in the initial operating experience review, control room survey, assessment, and selection of design improvements. Since that time the control room design review effort has been continued by TUGCO site and corporate engineers. Those engineers are currently involved in detailed implementation of corrections, task analysis, and comparison of task analysis results with the control room inventory. Several TUGCO personnel have previous human factors experience, but no one with specific training in the area is currently involved in the DCRDR.

Task analysis and comparison of results with a control room inventory. CPSES operations engineering is currently performing a task analysis based on plant specific Emergency Response Guidelines (ERGs). Those guidelines have been developed from generic Westinghouse Owners' Group ERGs. As described, the process includes identification of tasks and information and control requirements. A mechanism for identifying mismatches between information and

control requirements and actual instrumentation and controls (e.g., not available, not suitable) is provided via a check-off by operations engineering. According to TUGCO, mismatches identified by this process can, but do not have to be, resolved by human factors improvement in the control room. A Procedures Generation Package, outlining the above process, has been submitted for review by the NRC's Procedures and Systems Review Branch. Personnel with specific training and prior experience in human factors are not involved.

Verification that HEDs are corrected and do not create new HEDs. No formal process exists for the subject verifications. However, TUGCO corporate and site engineers in charge of the Control Room Design Review have been intimately involved in implementation of HED corrections in the control room. TUGCO stated that such involvement has allowed evaluation of the effectiveness of HED corrections as they are implemented, and that such evaluation has in several cases resulted in iteration of the design process until a successful correction for HEDs was selected (e.g., annunciator prioritization). In addition, CPSES operators are receiving training in human factors improvements of their control room. The operators have also been provided with a log book in which they can record HEDs they observe in the control room. HEDs, whether previously unidentified or introduced by changes in the control room, can thus be identified and tracked. Evaluation and resolution of such HEDs is the responsibility of operations engineering personnel who are also involved in the Control Room Design Review.

Coordination of control room improvements with changes from other programs. Changes from other programs have been coordinated with control room improvements in the following ways:

1. Safety Parameter Display System (SPDS) - Human factors input has been factored into SPDS development and integration into the control room.
2. Operator Training - A formal program in human factors improvements to the CPSES control room has been made part of operator requalification training.
3. Reg. Guide 1.97 - Implementation of Reg. Guide 1.97 is the responsibility of one of the TUGCO corporate engineers involved in the control room design review. There has been human factors review and improvement of Reg. Guide 1.97 instrumentation in the control room as part of the control room design review. Reg. Guide 1.97 Category 1 indicators are uniquely identified in the control room.
4. Upgraded Emergency Operating Procedures (EOPs) - The process used to develop EOPs involves an analysis by which Operations Engineering is identifying operator tasks and information and control needs. Output of that analysis is checked against control

room instruments and controls to determine availability and human factors suitability.

CONCLUSION

Based on the July 30 - August 3, 1984 audit the staff continues to expect that CPSES Unit 1 will be licensed on the basis of a control room Preliminary Design Assessment rather than a DCRDR. Pre- and post-licensing actions related to specific HEDs are spelled out in the preceding discussion.

Based on the staff's understanding of the CPSES Control Room Design Review, several of the DCRDR requirements in Supplement 1 to NUREG-0737 have not yet been fully satisfied. Chief among those requirements are:

1. Function and task analyses to identify control room operator tasks and information and control requirements during emergency operations
2. Comparison of display and control requirements with a control room inventory

As previously noted, efforts to satisfy those two requirements are ongoing. As part of the upgrade of emergency operating procedures, review of the function and task analysis process for generation of technically adequate EOPs is the responsibility of the Procedures and Systems Review branch. For the DCRDR, the information and control needs for all tasks identified as part of the EOPs should be compared with a control room inventory. Situations where an information or control need is not met by the control room inventory (i.e., instrument or control not available or unsuited to human performance of the task) should be treated in the same manner as any other HED. That is:

1. The unavailability or unsuitability should be assessed for safety significance
2. Resolutions should be developed for safety significant problems
3. There should be a verification that the resolution corrects the problem and does not create new HEDs

Resolutions to problems identified by comparing information and control needs with a control room inventory may take several forms including procedure changes, training, and human factors design improvement of the control room. In the staff's judgment, the entire process described above should involve persons with human factors training and experience as well as engineers. Participation of human factors specialists would enhance the ability to identify problems and to develop adequate resolutions to those problems.

Two other requirements which may not be fully satisfied are:

1. Verification that selected design improvements will provide the necessary correction
2. Verification that improvements will not introduce new HEDs

The above verifications contribute to development of a consistent, coherent, and integrated scheme for improving the control room interface with operators. The staff typically expects DCRDRs to include a formal verification process involving engineers, operators, and human factors specialists. Techniques might include partial re-surveys of control panels, walkthrough/talkthroughs on improved panels, environmental surveys, and operator interviews. The CPSES Program Plan did not address the above verifications. An informal process, previously described, was discussed during the July 30 - August 3, 1984 audit. TUGCO should document that process and the persons involved for evaluation by the NRC staff.

A Supplement to the "Human Factors Control Room Design Review of Comanche Peak Steam Electric Station" report should be provided to complete the Unit 1 DCRDR. Results of the comparison of task analysis results with a control room inventory, review of any new environmental HEDs, and review of HEDs deferred to the DCRDR should be provided in terms of:

1. An outline of proposed control room changes
2. An outline of proposed schedules for implementation
3. Summary justification for HEDs with safety significance to be left uncorrected or partially corrected

The verification processes discussed above should also be described.

An additional supplement should be provided 6 months prior to expected licensing of CPSES Unit 2. That supplement should provide DCRDR results associated with any differences between the CPSES Unit 1 and 2 control room and remote shutdown panel.

CPSES Open HEDs Following July 30 - August 3, 1984 Audit,

1.0 SUMMARY

1.	Implementation of correction and NRC audit prior to licensing				
	3	103	137	214	321
	68	106	179	225	338
	80	120	181	226	345
	88	122	184	267	
	93	130	201	269	
2.	Clarification of response prior to licensing				
	203	285	307		
3.	Post-licensing submission of environmental surveys				
	42	310	349		
	59	311	352		
	154	346	353		
	170	347			
	308	348			
4.	Post-licensing assessment and selection of design improvement as part of the ongoing DCRDR				
	342	354			

2.0 WORKSPACE

42	Close after licensing on basis of environmental survey	HFEB
59	Close after licensing on basis of environmental survey	HFEB
68	Confirmatory after installation of portable storage unit and storage of equipment	SRI
122	Confirmatory on completion of hierarchical labeling at Hot Shutdown Panel and Transfer Panels, labeling of light box, proper paper in recorders, and sound powered headsets at Hot Shutdown Panel (68 above) and Transfer Panels	SRI
154	Close after licensing on basis of environmental survey	HFEB
170	Close after licensing on basis of environmental survey	HFEB
342	Deferred until DCRDR	HFEB
346	Close after licensing on basis of environmental survey	HFEB

349	Close after licensing on basis of environmental survey	HFEB
352	Close after licensing on basis of environmental survey	HFEB
353	Close after licensing on basis of environmental survey	HFEB
354	Deferred until DCRDR	HFEB

3.0 COMMUNICATIONS

120	Confirmatory on storage of sound powered headset at the Hot Shutdown Panel (68 above)	SRI
347	Close after licensing on basis of environmental survey	HFEB

4.0 ANNUNCIATORS

3	Confirmatory on completion of annunciator prioritization	SRI
307	Close on clarification of response	HFEB
308	Close after licensing on basis of environmental survey	HFEB
310	Close after licensing on basis of environmental survey	HFEB
311	Close after licensing on basis of environmental survey	HFEB
321	Close on re-engraving of annunciator tiles	SRI

- 1-ALB-2: 3.7
- 1-ALB-3B: 2.6
- 1-ALB-4A: 4.4
- 1-ALB-4B: 1.5, 2.6, 3.6
- 1-ALB-5B: 2.1, 3.4
- 1-ALB-5C: 3.1, 4.2
- 1-ALB-6C: 1.2, 1.3, 2.1, 2.2, 2.7, 3.2, 3.3, 3.7, 4.2
- 1-ALB-6D: 1.4, 1.10, 1.14, 2.4, 2.13, 2.14, 3.13, 3.14, 4.13
- 1-ALB-8: 1.14, 2.13, 2.14, 3.14, 4.14
- 1-ALB-9: 1.4, 1.8, 1.11, 5.12, 7.6

5.0 CONTROLS

93	Confirmatory on installation of "T" handles on transfer switches at HSP (14 handles)	SRI
214	Confirmatory on permanent escutcheon plates on CB-11 (90-1EG2 and 65-1EG2)	SRI

226 Confirmatory on more secure attachment of setpoint knob covers on controllers SRI

6.0 VISUAL DISPLAYS

80 Confirmatory on "J" handle/star handle pointers being painted white SRI

88 Confirmatory on recorders having paper matching recorder scales (all recorders should have paper) SRI

179 Confirmatory on replacement of scale faces on two circular meters on CB-11 (A-BT1ED 1 and 2) SRI

181 Confirmatory on addition of Δ flux scale SRI

184 Confirmatory on full scale counters replacing .5 scale counters on CPS-01 SRI

201 Confirmatory - same scale faces as #179 (above) should say "discharge" and "charge" (not "-" and "+") SRI

203 Close on clarification HFEB

267 Confirmatory on replacement of frosted glass on recorders on CB-10 SRI

269 Confirmatory on bumpers being placed on bottom of "drop down" recorder doors SRI

338 Close on confirmation of TRAIN A and B designation for indicator lights SRI

7.0 LABELS AND LOCATION AIDS

103 Confirmatory on label on "sequence of events recorder" SRI

106 Confirmatory on labels on recorders on CV-04, incore panel, and for lights on CV-03 SRI

130 Confirmatory on new escutcheon plates for 1-HS-2491 through 1-HS-2494 on CB-09 SRI

225 Confirmatory on "LOCK" position labels on Hagan controllers SRI

8.0 PROCESS COMPUTERS

345 Confirmatory on revision of point descriptions in P2500 to use CPSES abbreviations. SRI

9.0 PANEL LAYOUT

137 Confirmatory on label change in mimics SRI

285 Close on clarification about rearrangement HFEB

10.0 CONTROL/DISPLAY INTEGRATION